

OTERM.DOC -- OTERM Terminal Simulator

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Version 3.00 15 May 82

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Credits.

The protocol used for file transmission was developed by Ward Christensen.

The protocol was extended to use the cyclical redundancy code by John Mahr.

The subprogram to compute the cyclical redundancy code was written by Paul Hansknecht.

All three gentlemen have made their work freely available for noncommercial purposes.



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## Description.

OTERM allows the user to communicate with time sharing services, computerised bulletin boards, and other computers. Special features of OTERM include:

- a circular log of the session is kept. This log is under the control of the user.
- an optional warning is provided when the log is almost full. If the remote device supports it, transmission will be halted with a control S. If a file is being sent, the transmission is interrupted (it can be restarted.)
- a file may be received without a protocol. If the remote supports ^s/^q to stop and start transmission, the file may be larger than main memory.
- files may be sent to the remote computer without a special protocol for transmission.
- any command which can be entered from the keyboard may also be entered from a file. This allows automatic setting of modes for transmission of the file.
- file transmission may be interrupted from the keyboard or from a command contained in the file. Transmission may be restarted without loss of data.
- the Ward Christensen modem protocol is implemented. This allows error free com-

munications with remote CP/Ms or other computers.

- optionally lines may be wrapped so as to keep words on a single line (word wrap)
- commands to OTERM are entered as escape sequences. Help menus are available using the "?" key.

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Limitations.

OTERM will run only on an Osborne 1 computer. The revision level must be 1.2 or higher (the original rev A is no longer supported).

No printer support is provided.

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New features/corrections in version 3.

Note: Version 3.0 is almost a complete rewrite of the program.

Ward Christensen's modem protocol has been implemented.

Automatic writins of the los has been implemented.

Function keys are now handled properly.

Overall timings has been improved.

OTERM now recognizes a disconnected modem and will not fill the buffer unless the modem is connected and turned on.

OTERM can now take file name responses (e.g. for writins the los) from the file beins read.

The write los command has been changed to <esc>bo.

A wait command has been added to improve ability to communicate with other systems.

The delay algorithms have been improved. Transmission at 1200 baud without a protocol is now feasible. Previous user's may find that different delay settings are necessary.

OTERM now automatically temporarily inhibits horizontal scrolling if the line size is 52 or less. This allows easy use of any line size regardless of the disk configuration.

A minor bug in the display when sending a file was

corrected.



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Known deficiencies.

Testing of host mode has been limited. Transmission  
of files in host mode has not been tested.

Testing of 1200 baud operation has been limited.

No testing of use of the modem port has been done.

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Using OTERM (summary).

The modem should always be in full duplex mode for use with OTERM. Follow the modem manufacturer's and the Osborne instructions for connecting the modem. Note that almost all modem's will require that pin 2 on the modem be connected to pin 3 on the computer and pin 3 on the modem be connected to pin 2 on the computer.

On exiting OTERM the RS232 interface will be reset to the same options as at entry.

As distributed, on startup OTERM is set to communicate with most time sharing services. The default characteristics may be changed temporarily or OTERM can easily be modified to start up with different characteristics.

Establish communications following the modem manufacturer's and the remote service's instructions.

Commands to OTERM are entered as escape sequences. The following commands are recognized:

Display command summary:

esc ? -- display command summary

Logging commands:

esc bc -- clear log and start logging  
esc bd -- suspend logging  
esc be -- resume logging  
esc bf -- set auto writing of log  
esc bo -- write log to disk

```
esc bq      -- no warnings on los full
esc bw      -- warn when los full
esc bz      -- close auto los file
```

## Console handling commands:

```
esc cb      -- reset delete on bs mode
esc cc      -- set clear on ff mode
esc cd      -- set delete on bs mode
esc cf      -- reset clear on ff mode
esc cl      -- set console lf w/cr mode
esc cm      -- reset console lf w/cr mode
esc cw      -- set word wrap on
esc cx      -- set word wrap off
```

## Delay mode commands:

```
esc db      -- set both line & char delay
```

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```
mode
esc dc  -- set char delay mode
esc dl  -- set line delay mode
esc dn  -- reset both line & char delay
esc dpx -- set line prompt char to x
esc dq  -- clear line prompt char
esc ds  -- set remote ^S/^Q
esc dt  -- reset remote ^S/^Q
esc dw  -- set delay until char
esc dx  -- set delay until time
```

Input file mode commands:

```
esc fh  -- halt file read
esc fl  -- send lf from file
esc fm  -- suppress lf from file
```

Set line size:

```
esc ln<cr> -- set line size nnn
```

Transmission mode commands:

```
esc m1  -- set 300 baud
esc m2  -- set 1200 baud
esc m7  -- set 7 bit transmission
esc m8  -- set 8 bit transmission
esc me  -- set even parity
esc mf  -- set full duplex mode
esc ms  -- set host mode
esc mh  -- set half duplex mode
esc ml  -- set xmit lf w/cr mode
esc mm  -- reset xmit lf w/cr mode
esc mn  -- set no parity
esc mo  -- set odd parity
```

Protocol File Transmission.

esc PC -- receive a file with crc  
checking  
esc PR -- receive a file with checksum  
checking  
esc PS -- send a file

## Quit OTERM:

esc q -- return to CP/M

## Send a File:

esc r -- read file

## Display status:

esc s -- display status

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Wait (used to give remote time):

esc w -- wait

Clear screen:

esc z -- local clear screen (nothing  
transmitted)

Commands are entered without spaces. A space may be used to cancel most commands. All commands may be entered as upper or lower case.

If a "?" is entered after the first letter of any command which requires more than one character, a summary of the options available is displayed. The command sequence is not terminated and the desired option character may now be entered.

The log is always cleared when OTERM is started.

Several commands require the entry of a file name. OTERM uses a generalized file system which does not permit the use of "/" or "\" in a file name (of course the usual illegal characters are not allowed). The slashes are used to set flags for the file system. The only flag which is of use in OTERM is \b, which causes an old file with the same name to be deleted, rather than renamed to <name>.bak. Simply append this flag to the end of the name (after the extension) with no intervening spaces.

All file names may be entered in upper or lower case.

A new disk may be mounted on any drive which does not contain any open files. If a new disk is mounted on a drive which has open files, the familiar CP/M read only message may be issued and the program may abort.

To modify OTERM to use new defaults, simply enter the desired commands, exit with the `esc q` command, and save the program with the CP/M command:

`save 56 OTERM.com`

The following sections describe in detail the use of these commands.



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## Logging commands.

A log of the session is kept in memory. As distributed, this log is enabled at start up. The log is circular; that is, when the log is filled, characters at the beginning are deleted as new characters are added. The exact size of the log depends on the version. In current versions it is about 32,000 characters.

In full duplex mode, only characters received from the remote device are entered in the log. In half duplex mode all characters sent or received are entered. In host mode only characters sent are entered in the log.

Since OTERM does not recognize deletion of characters or lines, it usually will be necessary to edit the log after writing it to disk to eliminate errors. The log may be edited with WordStar or ED. This is also useful for eliminating extraneous material from the log (e.g. commands or messages when a program source file is listed and logged.)

A common (and the simplest) method of using the log is to simply ignore it until something is received which one wants to save. The log is then saved and later edited to eliminate unwanted material with the command:

esc bo -- write the log to disk

The log file may later be edited with WordStar or ED or may be printed.

After entering this command, OTERM will ask:

Write file name?

Enter a legal CP/M file name (with drive if the file is not to be on the default CP/M disk) followed by return.

If the file cannot be created. OTERM will display the message:

Cannot open

and will ask for the file name again.

In some cases a file system message may also be displayed. These indicate disk full or i/o errors.

The log will be written to the disk. If there is an i/o error or there is not enough room for the file,

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a file system message will be displayed. In this case, the file may have been partially or completely written. It may appear on the disk with the name \$\$\$\$nnnn.\$\$\$ (nnnn is a number). The safest course is to change disks and try again.

One may set OTERM to automatically write the log to disk whenever it gets near full by entering:

```
esc bf      -- set auto writing of log
```

This will only work without loss of data if the remote may be halted with control S and restarted with control Q. OTERM will ask for the file name as when simply writing the log and will write the log to disk. However, instead of closing the output file, OTERM will clear the log and will write and clear the log again whenever it is near full. This will also be done before the log is cleared (see below).

To close the auto log file, enter the command:

```
esc bz      -- close auto log file
```

The log will first be written. The log file will automatically be written and closed when OTERM is terminated.

In some cases, one may wish to log only parts of a session or to keep data which might overflow the log. In these cases the logging commands are used:

```
esc bc      -- clear log and start logging
esc bd      -- suspend logging
esc be      -- resume logging
esc bq      -- no warnings on log full
```

esc bw -- warn when los full

Simply type esc bc the first time you wish to keep the following data. When the data you wish to keep is finished, type esc bd. If more data you wish to keep is about to be received, type esc be to start the los again.

Esc bd and esc may also be used to prevent auto lossins of certain data.

When listing a long document, one does not want to lose the beginning simply because the los is full. To prevent this, type the command esc bw. When 256 characters remain in the los, you will be warned by a series of three beeps. If a file is being transmitted, it will be halted. (It can be continued without loss of data.) Also, if the remote device

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responds to control S - control Q for stopping and starting transmission (see delay mode commands), a control S will be sent.

To return to simple logging without warning of log overflow, use the command esc bq.



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Console handling commands.

The console handling commands control the display of information sent or received. They have no effect on the log or on the data transmitted:

esc cb	--	reset delete on bs mode
esc cc	--	set clear on ff mode
esc cd	--	set delete on bs mode
esc cf	--	reset clear on ff mode
esc cl	--	set console lf w/cr mode
esc cm	--	reset console lf w/cr mode
esc cw	--	set word wrap mode
esc cx	--	reset word wrap mode

Many timesharing services use a backspace (control h or left cursor) for deletion of characters. Normally, the Osborne 1 simply backspaces but does not delete the character. This is harmless but may be confusing if several characters are deleted. To cause a character to be deleted when a backspace is displayed, enter the command esc cd. To cause a backspace to simply move the cursor, use the command esc db.

Some timesharing services and bulletin boards send a form feed to signal end of page. Normally this moves the cursor right one position on the Osborne 1. To clear the screen when a form feed is displayed use the command esc cc. To return to the normal Osborne handling (necessary for systems which use form feed for cursor positioning rather than new page) use the command esc cf.

Most timesharing services and bulletin boards will send a "free" line feed in response to a carriage return. Therefore, normally the display should not

advance a line when a carriage return is displayed. To handle the occasional system which does not provide line feeds, type esc cl. This will interpret a carriage return as on a typewriter, advancing to the next line. To return to normal handling, no advance as on a teletypewriter, use the command esc cm.



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Most timesharing services format the output for 72 or 80 character terminals. The line size may be set to 52 characters (see below), but if words are split at the end of the line, this may be confusing. To help keep a coherent display, word wrap may be set (esc cw). This will keep words on a line if possible. For the purposes of OTERM, a word is defined as any sequence of characters not including spaces or control characters. Note that the word wrapping is based on the line size set for OTERM, not on the physical dimensions of the screen. In order for this to be very useful, the line size must be set no greater than the physical screen size.

To keep the display looking as normal as possible, OTERM does not display spaces or tabs at the beginning of a line that was started automatically by word wrap. Since word wrap is operative on characters you enter, it may appear that the remote service is not responding. If this appears to be the case, try typing a printing character. A compromise was needed here, since it is not possible for OTERM to determine whether a character received from a full duplex system is an echo of the character you typed or not.

Word wrap may cause problems when transmitting a file (although this should be very rare unless you are using 1200 baud). To turn off word wrap, use the command esc cx.



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## Delay mode commands.

When sending a file to a remote computer, it may be necessary to give the remote some time to process the data. This is particularly important when accessing bulletin boards. Most timesharing services require little or no delay. However, since the remote may be transmitting at the same time as OTERM, some characters may be lost from the display or the display may be garbled. In many cases the delay modes may be used to generate coherent displays.

esc db	-- set both line & char delay mode
esc dc	-- set char delay mode
esc dl	-- set line delay mode
esc dn	-- reset both line & char delay
esc dpx	-- set line prompt char to x
esc dq	-- clear line prompt char
esc ds	-- set remote ^S/^Q
esc dt	-- reset remote ^S/^Q
esc dw	-- set delay until char
esc dx	-- set delay until time

OTERM may be set to delay after each character (esc dc), to delay after each line (esc dl), to delay after each character and each line (esc db) or not to delay (esc dn).

The delay time may be set to any digit 1-9. If the delay time is n, there will be a delay of approximately  $n/20$  seconds at 300 baud and  $n/100$  seconds at 1200 baud. This time is doubled for a line delay unless line feeds are being supplied on the screen (esc cl) or on the transmission (esc ml).

If the delay time is 0, OTERM will delay until a character is received.

Usually it will be sufficient to delay only until a character is received. To cause the delay to be terminated by a character, type esc dc. To always delay for the specified time, use the command esc dx. This has no effect if the delay time is 0 -- in that case delay is always until a character is received.

In some cases it may be possible to simply send a line and then wait for a prompt before sending the next line. This is almost mandatory when sending to half duplex systems. To set OTERM to wait after a line until a specified character x is received, use the command esc dpx. x may be any character including space. The case of x is significant. To

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clear the line prompt character, use the command esc dq.

For example, many bulletin boards will always prompt with a question mark when input is desired. esc P? will prevent a new line from a file from being transmitted until the question mark is received.

The line prompt character overrides any line delay, but not the character delay.

When sending a file, OTERM must periodically read from the disk. This may take over a second. OTERM will delay before reading the disk, but even so some received data may be lost. If the remote device responds to control S by halting transmission and responds to control Q by restarting, this can be prevented by sending control S before reading the disk and control Q when ready for more data. To inform OTERM that this is possible, enter the command esc ds. To inform OTERM that control S/control Q may not be used, enter the command esc dt.

NOTE: the control S may also be used to prevent overrunning the los. No control Q is sent automatically in that case.



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Input file mode commands.

esc fh	--	halt file read
esc fl	--	send lf from file
esc fm	--	suppress lf from file

The esc fh command is usefull only if included in a file beins sent. It suspends transmittins the file and returns control to the keyboard. The file may be continued without loss of data (see Read File).

Standard CP/M files contain a line feed after each carriage return. Since most timesharing services and bulletin boards supply line feeds, one usually does not want to transmit them. To ignore line feeds from files beins sent, use the command esc fm.

Some timesharing services provide a "tape" mode in which line feeds are not provided. Transmission may be more satisfactory if files are sent in this mode. To use such a mode or for services which do require line feeds, use the command esc fl.

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Set line size:

```
esc ln<cr> -- set line size n
```

OTERM can send or receive lines of any length. Usually it will be more convenient if the data all fits on the screen. Therefore OTERM is distributed with a default line size of 52 characters. At the end of a line, the display will skip to the beginning of the next line.

To change the line size, enter `esc l<linesize>` <return>.

Line size will be taken mod 256. If greater than 128, 128 will be used. If zero, the line size will not be changed.

If a question mark is entered after the l, instructions will be displayed. Any previous disits will be ignored.

NOTE: The line size affects only the display. The los and the transmission are not affected.

NOTE: The line size set in OTERM is in effect only in OTERM. When OTERM is ended the linesize is restored to the value that was set when CP/M was loaded or which was last set by SETUP.

NOTE: If the linesize is 52 or less, the display will not automatically scroll horizontally. If the linesize is greater than 52, the scrolling option on the disk will be respected. In any case, horizontal scrolling will be set back to the original setting when OTERM is

terminated. If the remote controls the  
display with escape sequences, horizontal  
scrolling must be off.

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Transmission mode commands.

Several characteristics must be set to match those of the remote device.

esc m1	--	set 300 baud
esc m2	--	set 1200 baud
esc m7	--	set 7 bit transmission
esc m8	--	set 8 bit transmission
esc me	--	set even parity
esc mf	--	set full duplex mode
esc ms	--	set host mode
esc mh	--	set half duplex mode
esc ml	--	set xmit lf w/cr mode
esc mm	--	reset xmit lf w/cr mode
esc mn	--	set no parity
esc mo	--	set odd parity
esc mr	--	modem on rs232 connector
esc ms	--	modem on serial (modem) connector

The data rate must match that of the remote device. Set 300 baud (esc m1) or 1200 baud (esc m2) as required.

OTERM and the remote device must agree as to the number of bits to be transmitted for each character and the parity of each character. Select 7 bits (esc m7) or 8 bits (esc m8) and parity even (esc me), parity odd (esc mo) or no parity (esc mn) as required.

Most services will accept 300 baud 8 bits and no parity. 1200 baud operation, if available, will be faster and in many cases more economical.

OTERM supports a modem connected to either the RS232

or the modem connector on the front of the Osborne 1. To use the RS232 connector, use the command `esc mr`. To use the modem connector, use the command `esc ms`.

In full duplex mode, characters transmitted are not automatically displayed. This mode is used to communicate with most timesharing services and bulletin boards (these services automatically send back any characters sent.) To enter full duplex mode, use the command `esc mf`.

A few services use half duplex mode. In this mode, the terminal (OTERM) is responsible for displaying the characters it sends. To enter half duplex mode use the command `esc mh`.

To communicate with a terminal or a computer using a

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"dumb" terminal program, use the command `esc ms` to enter host mode. In this mode, characters sent by OTERM are displayed and characters received are echoed back to the remote device.

Many services offer a choice between full and half duplex mode. The most common problem in communications is noise on the phone line. If you use full duplex, a correctly displayed character is evidence that the remote device received your transmission properly. Therefore, full duplex is recommended whenever possible.

Full/half/host are set independently of the handling of line feeds. In host mode it will almost always be necessary to send a line feed after each carriage return. To do this use the command `esc ml`. To stop automatic sending of line feeds, use the command `esc mm`.

The following possible problems may be caused by improper settings of modes:

Characters sent are displayed twice. Characters received are displayed once. You are in half duplex mode and the remote assumes you are in full duplex. Enter `esc mf`.

Characters sent or received are sent twice. You are in host mode and the remote assumes you are in full duplex mode. Enter `esc mf`.

Characters sent are not displayed. Characters received are displayed. You are in full duplex mode but the remote assumes you are in half duplex mode. Enter `esc mh`.

The display double or triple spaces or does not skip between lines. Line feeds may be supplied on the screen only by esc cl, may be automatically transmitted by esc ml, or may be provided by the remote device. If more than one source is providing line feeds, the display will multiple space. If none is, then lines will overwrite.

Characters received are not displayed or are garbled. The data rate, number of bits, or parity are incorrect. Check with the remote service for the correct settings. If received characters are not displayed, it is possible that the modem is not connected as OTERM expects. Set OTERM to use the RS232 or modem connector as required. If this happens occasionally, your modem is not working properly or there is noise on the phone line.

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## Protocol File Transmission.

A major problem in sending and receiving files is line noise. To prevent contamination of data, a protocol may be used which includes error checking. If an error is detected, the data is retransmitted. OTERM includes the popular Ward Christensen modem protocol which is used by remote CP/Ms (RCPMs) in North America. Programs which use this protocol are available for almost any computer using CP/M, generally in the public domain. To transmit a file one must start up one of the programs as a receiver and the other as a sender. The method of doing this will, of course, depend on the program being used. For OTERM one uses one of the commands:

esc PC	--	receive a file with crc checking
esc PR	--	receive a file with checksum checking
esc PS	--	send a file

OTERM will ask for the file name and will then begin transmission.

Note that there are two receive commands. Cyclical Redundancy Code (crc) checking is more reliable, reducing the chances of an undetected error to near zero. It is not universally available, however. To communicate with those systems which do not allow crc checking, one may use checksum checking. This is still very reliable.

In this protocol, the transmission is controlled by the receiver. If crc checking is requested of the receiver, it will notify the sender.

Data is transmitted in blocks of 128 characters. Any type file, binary or ascii, may be transmitted. OTERM will inform you if crc checking is requested and will display the block numbers as it is transmitting. Various error conditions may be displayed. It is beyond the scope of this document to explain all of the error condition -- they will be self explanatory to someone who understands the protocol. Transmission error messages are no cause for concern unless there are a large number of them or they prevent transmission.

One message is a bit unusual however. Some programs use a control X (ascii cancel) to signal premature cancelation of the transmission. This is somewhat dangerous as line noise may be responsible for a spurious cancel. Rather than canceling, OTERM treats this as any other unexpected character except



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that the message reports that a cancel was received. If you see several of these, it is likely that the other station is trying to terminate the transmission.

You may terminate a transmission by typing esc. Termination may take up to 10 seconds. Note that OTERM does not signal the other station that the transmission was terminated. Most programs will terminate the transmission if no response is received in some period of time.

OTERM differs from most other programs using this protocol in a few respects. Generally the operator is asked if a transmission should be cancelled after 10 consecutive errors are detected. For simplicity, OTERM does not ask -- it just cancels.

Also, taking a suggestion from Ward Christensen, when OTERM is the sender it will not automatically retransmit if no response is received in 10 seconds. This is still compatible with the majority of the programs which do retransmit in this situation.

Although the transmission protocols are compatible, some programs have different timing restrictions at start of transmission. To prevent problems, the following should be observed:

Before pressing return after entering the file name, the modem should be on and the phone connected to the modem (or the handset in the modem cradle). This is very critical if crc checking is being done.

The sender should be started first. This is not necessary if the receiver is OTERM or the xmodem

Program used by RCPMs. It is very important if  
crc checking is to be used with some other  
programs though.

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Quit OTERM:

esc q -- return to CP/M

This command returns to CP/M.

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Send File:

esc r -- read file

This command sends a file previously prepared with WordStar or ED. For proper transmission, delay modes or file modes may have to be set.

The file being transmitted may contain OTERM commands. These will be processed as if entered at the keyboard. This includes file names required by various OTERM commands. Any command which requires a file name must be followed by a file name and a carriage return or by an immediate carriage return. If followed by an immediate carriage return, the file name must be entered at the keyboard. Transmission of the file being read will continue after execution of the command.

If an OTERM read command is encountered in a file, the new file will be read and transmitted. At the end of the new file control will return to the keyboard, not to the previous file. In other words, reading of files is chained, not nested.

To stop transmission of a file, type esc. Any other key is ignored.

After entering this command, OTERM will ask:

Read file name (\* to continue)?

Enter a legal CP/M file name (with device if not on the default disk) followed by return. If entered in lower case the file name will be converted to upper case.

If the file cannot be found, OTERM will display the message:

Cannot open

and will ask for the file name again.

If you do not wish to read a file, simply respond with return.

If you wish to continue sending a file which was halted, respond "\*" return.

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Display status:

esc s -- display status

This command displays the current settings of all modes. The display with all modes set as originally distributed is:

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## OTERM STATUS

full duplex	line sz: 52		
console --	auto lf: off	bs del: on	
	ff clr: on		
	wordwrap: on		
transmit --	auto lf: off	port: RS232	
	bits: 8	parity: none	
	rate: 300		
file --	suppr lf: on		
delay: char	char: on	line: off	
	ln prmt: none	^S/^Q: on	
	time: 1		
lods: on	warn: off		
	using: 0 of 32000		
	file:		





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Wait:

esc w -- wait

This command is followed by the number of seconds which OTERM is to delay. The number is taken modulo 256 with zero being treated as 256. During this delay OTERM will accept input from the remote, but will ignore local input. This is useful to give the remote time to perform a function. Obviously, this command is of no value except when reading a file.

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Clear screen:

esc z -- local clear screen(nothing transmitted

This command clears the screen. This is a local operation. Nothing is transmitted or loaded.



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